

WHAT IS CLAIMED IS:

1. A MEMS device, comprising:
a plurality of actuator layers formed over a substrate;
a bimorph actuator having a substantially serpentine pattern, wherein the serpentine pattern is a staggered pattern having a plurality of static segments interlaced with a plurality of deformable segments, each of the plurality of static segments having a static segment length and each of the plurality of deformable segments having a deformable segment length, wherein the deformable segment length is substantially different than the static segment length, and wherein at least a portion of each of the plurality of deformable segments and each of the plurality of static segments is defined from a common one of the plurality of actuator layers.
2. The device of claim 1 wherein each of the plurality of static segments is defined from a first one of the plurality of actuator layers and each of the plurality of deformable segments is defined from the first one and an adjacent second one of the plurality of actuator layers.
3. The device of claim 1 wherein the first and second ones of the plurality of actuator layers have different coefficients of thermal expansion.
4. The device of claim 1 further comprising a payload coupled to the bimorph actuator and movable between first and second orientations in response to exposure of the bimorph actuator to one of thermal energy and electrical energy.
5. The device of claim 1 wherein at least one of the plurality of deformable segments and the plurality of static segments has a substantially rectilinear pattern.
6. The device of claim 1 wherein at least one of the plurality of deformable segments and the plurality of static segments has a substantially curvilinear pattern.

7. A MEMS device, comprising:
a plurality of actuator layers formed over a substrate;
a bimorph actuator comprising a plurality of segments defined from the plurality of actuator layers and each including a number of turns and laterally offset from neighboring ones of the plurality of segments, the plurality of segments thereby forming a helical configuration.

8. The device of claim 7 wherein a first one of the plurality of segments includes:
a first portion defined from a first one of the plurality of actuator layers, wherein a first end of the first portion is electrically connected to a second one of the plurality of segments laterally disposed from the first one of the plurality of segments;

a second portion defined from a second one of the plurality of actuator layers, wherein a first end of the second portion is electrically connected to a second end of the first portion;
and

a third portion defined from the first one of the plurality of actuator layers, wherein a first end of the third portion is electrically connected to a second end of the second portion, and wherein a second end of the third portion is electrically connected to a third one of the plurality of segments laterally disposed from the first one of the plurality of segments.

9. The device of claim 8 wherein the second portion is defined from the second one of the plurality of actuator layers and an adjacent third one of the plurality of actuator layers.

10. The device of claim 7 further comprising a payload coupled to the bimorph actuator and movable between first and second orientations in response to exposure of the bimorph actuator to one of thermal energy and electrical energy.

11. The device of claim 7 wherein at least one of the plurality of segments has a substantially rectilinear pattern.

12. The device of claim 7 wherein at least one of the plurality of segments has a substantially curvilinear pattern.

13. A MEMS device, comprising:
 - a plurality of actuator layers formed over a substrate;
 - a bimorph actuator comprising a plurality of segments defined from the plurality of actuator layers and each having a substantially figure-8 shaped configuration.
14. The device of claim 13 wherein a first one of the plurality of segments includes:
 - a first portion defined from a first one of the plurality of actuator layers, wherein a first end of the first portion is electrically connected to a second one of the plurality of segments laterally disposed from the first one of the plurality of segments;
 - a second portion defined from a second one of the plurality of actuator layers, wherein a first end of the second portion is electrically connected to a second end of the first portion;
 - a third portion defined from the first one of the plurality of actuator layers, wherein a first end of the third portion is electrically connected to a second end of the second portion; and
 - a fourth portion defined from the second one of the plurality of actuator layers, wherein a first end of the fourth portion is electrically connected to a second end of the third portion, and wherein a second end of the fourth portion is electrically connected to a third one of the plurality of segments laterally disposed from the first one of the plurality of segments.
15. The device of claim 14 wherein the second and fourth portions are defined from the second one of the plurality of actuator layers and an adjacent third one of the plurality of actuator layers.
16. The device of claim 13 further comprising a payload coupled to the bimorph actuator and movable between first and second orientations in response to exposure of the bimorph actuator to one of thermal energy and electrical energy.
17. The device of claim 13 wherein at least one of the plurality of segments has a substantially rectilinear pattern.
18. The device of claim 13 wherein at least one of the plurality of segments has a substantially curvilinear pattern.

19. The device of claim 13 wherein the actuator has a patterned line width of less than about 50 microns.

20. The device of claim 13 wherein the actuator has a patterned line width of less than about 1000 nm.